CLAIMS

We claim:

1. A light-emitting device comprising:

a heterostructure of III-nitride materials comprising an active region having a peak emission wavelength, an n-layer, and a p-layer;

a p- and an n-electrode, the p-electrode being attached to the p-layer, the n-electrode being attached to the n-layer; and

a superstrate, having a refractive index greater than 1.8, attached to the heterostructure.

2. A light-emitting device, as defined in claim 1, wherein the superstrate has an absorption coefficient less than 3 $cm^{-1}$ at the peak emission wavelength.

3. A light-emitting device, as defined in claim 1, wherein the p-electrode has an absorption less than 25%.

4. A light-emitting device, as defined in claim 1, wherein at least one of the layers comprising the heterostructure is textured.

5. A light-emitting device, as defined in claim 1, wherein the superstrate is selected from a group that includes SiC, ZnO, YAG, ZnSe, ZnS, zirconia, diamond, and CdS.

6. A light-emitting device, as defined in claim 5, wherein the superstrate is SiC and has a resistivity greater than 0.5 Ωcm.

7. A light-emitting device, as defined in claim 1, wherein at least one surface of the superstrate is roughened.

8. A light-emitting device, as defined in claim 1, wherein a top surface area of the superstrate is larger than a bottom surface area of the superstrate.

9. A light-emitting device, as defined in claim 1, wherein a portion of the p-electrode interposes portions of the n-electrode.

10. A light-emitting device, as defined in claim 1, wherein the p-electrode comprises $Au/NiO_x/Al$.

11. A light-emitting device, as defined in claim 1, wherein light is extracted from the active region through the superstrate.

12. A light-emitting device, as defined in claim 1, further comprising:
a submount;
an n-interconnect connecting the n-electrode to the submount; and
a p-interconnect connecting the p-electrode to the submount.

13. A light-emitting device, as defined in claim 12, wherein the n-interconnect and p-interconnect are selected from the group consisting of solder, elemental metals, metal alloys, semiconductor-metal alloys, thermally and electrically conductive pastes, thermally and electrically conductive compounds, epoxies, eutectic joints, Au stud-bumps, and solder bumps.

14. A light-emitting device, as defined in claim 12, further comprising:
a p-conductive interface disposed between the p-interconnect and the p-electrode; and
an n-conductive interface disposed between the n-interconnect and the n-electrode.

15. A light-emitting device, as defined in claim 14, wherein the p-conductive interface and the n-conductive interface comprise wettable metals.

16. A light-emitting device, as defined in claim 14, wherein the lateral corss sectional area of the n-conductive interface and the p-conductive interface is at least 15% of an area of the p-electrode.

17. A light-emitting device, as defined in claim 14, further comprising a barrier layer disposed between the p-electrode and the p-conductive interface.

18. A light-emitting device, as defined in claim 17, wherein the barrier layer is selected from the group consisting of Ni, Cr, Cu, and Ti.

19. A light-emitting device, as defined in claim 12, wherein the submount comprises a material selected from the group consisting of Si, AlN, and BeO.

20. A light-emitting device, as defined in claim 12, wherein the submount has a thickness less than 250 μm.